

Claims:

1. A plug-dropping container within a head member for releasing an object into a wellbore, the plug-dropping container comprising:

a tubular housing;

a tubular canister disposed within and generally aligned with the tubular housing so as to define an annulus between the tubular housing and the canister, the canister having an inner surface;

a channel along the inner surface of the canister, the canister channel being configured to receive the object therein;

a valve disposed within the tubular housing proximal to the lower end of canister, the valve having a solid surface, and having a channel through the valve;

wherein the valve is movable from an object-retained position to an object-released position such that (1) in its object-retained position, the solid surface of the valve substantially blocks the object from exiting the canister, but fluids are permitted to flow around the valve, and (2) in its object-released position, the channel of the valve is in substantial alignment with the channel of the canister thereby permitting the object to exit the canister and to travel downward through the channel of the valve, and the solid surface of the valve substantially blocks the flow of fluid around the valve.

2. The plug-dropping container of claim 1, wherein the object is a plug.

3. The plug-dropping container of claim 2, wherein the plug is a dart.

4. The plug-dropping container of claim 1, wherein the object is a ball.

5. The plug-dropping container of claim 1, wherein the object is a bomb.

6. The plug-dropping container of claim 1, wherein the tubular housing comprises a top opening and a bottom opening, and wherein the housing is in fluid

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

communication with a channel in the head member through which fluids are circulated into the wellbore.

7. The plug-dropping container of claim 6, wherein the canister further comprises:

a top opening;

a bottom opening; and

a bypass area for placing the inner surface of the canister in fluid communication with the annulus between the housing and the canister.

8. The plug-dropping container of claim 7, wherein the bypass defines at least one port disposed in the canister.

9. The plug dropping container of claim 7, wherein the bypass defines a gap between the top opening of the canister and the head member.

10. The plug-dropping container of claim 1, wherein:

the solid surface of the valve defines a radial surface; and

the valve has a truncated portion so as to disrupt the radial surface around the valve channel, thus providing a means for bypass flow past the valve when the valve is in its object-retained position.

11. The plug-dropping container of claim 10, wherein the radial surface of the valve is rotated into close proximity with a lower opening in the canister so that it blocks release of the object when the valve is in its object-retained position.

12. The plug-dropping container of 11, wherein the valve is spherical in shape.

13. The plug-dropping container of claim 10, wherein the valve is cylindrical in shape.

14. The plug-dropping container of claims 12 and 13, further comprising a stop member for limiting rotation of the valve to approximately 90 degrees.
15. The plug-dropping container of claim 14, wherein rotation of the retaining valve is via a shaft.
16. The plug-dropping container of claim 15, wherein rotation of the valve is accomplished manually.
17. The plug-dropping container of claim 15, wherein rotation of the valve is power driven.
18. The plug-dropping container of 1, wherein the valve defines a plate.
19. The plug-dropping container of 18, wherein the plate comprises:
a solid portion as the solid surface; and
a through-opening offset from the solid portion to serve as the channel.
20. The plug-dropping container of 19, wherein the plate further comprises:
teeth along at least one side of the plate for interacting with a gear;
21. The plug-dropping container of 1, wherein the valve defines a flapper valve.
22. The plug-dropping container of 21, wherein:
the flapper valve comprises a solid curved flapper to serve as the solid surface, and a seat to serve as the channel;
the canister comprises a lower bypass port positioned below the flapper valve; and
the flapper valve further comprises a shaft for rotating the flapper from (1) an object-retained position such that the flapper blocks the downward release of the object from the canister to an object-released position but permits fluid to flow from

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

the annulus, around the flapper, and through the lower bypass port, to (2) an object-released position such that the flapper substantially seals the lower bypass port and the seat receives the object.

23. The plug-dropping container of claim 7, wherein the head member is a cementing head.

24. The plug-dropping container of claim 7, further comprising at least one spacer disposed between the housing and the canister for essentially centralizing the canister within the housing.

25. A plug-dropping container for dispensing plugs into a wellbore during a cementing operation, the plug-dropping container being connected to a cementing head having a fluid flow channel therein for receiving fluids, the plug-dropping container, comprising:

- a tubular housing having a top opening and a bottom opening, the housing being in fluid communication with the bore in the cementing head;

- an upper canister disposed within and generally aligned with the housing so as to define an upper annulus between the tubular housing and the upper canister, the upper canister also having a top opening and a bottom opening;

- a channel within the upper canister, the channel of the upper canister being configured to receive a top plug therein;

- an upper bypass proximate to the top opening of the upper canister for permitting fluid to flow into the upper annulus;

- an upper plug-retaining valve disposed within the housing proximal to the bottom opening of the upper canister, the upper plug-retaining valve having a solid surface, and having a channel through the valve;

- a lower canister disposed within and generally aligned with the housing and below the upper plug-retaining valve so as to define a lower annulus between the housing and the lower canister, the lower canister also having a top opening and a bottom opening;

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

a channel within the lower canister, the channel of the lower canister being configured to receive a bottom plug therein;

a lower bypass proximate to the top opening of the lower canister for permitting fluid to flow into the lower annulus;

a lower plug-retaining valve disposed within the housing below the bottom opening of the lower canister, the lower plug-retaining valve having a solid surface, and having a channel through the valve;

wherein the lower plug-retaining valve is movable from a plug-retained position to a plug-released position such that (1) in its plug-retained position, the solid surface of the lower valve substantially blocks the plug from exiting the lower canister, but fluids are permitted to flow around the lower valve, and (2) in its plug-released position, the channel of the lower valve is in substantial alignment with the channel of the lower canister thereby permitting the plug to exit the lower canister and to travel downward through the channel of the lower valve, and the solid surface of the valve substantially blocks the flow of fluid around the valve; and

wherein the upper plug-retaining valve is movable from a plug-retained position to a plug-released position such that (1) in its plug-retained position, the solid surface of the upper valve substantially blocks the plug bottom from exiting the lower canister, but fluids are permitted to flow around the lower valve, and (2) in its plug-released position, the channel of the upper valve is in substantial alignment with the channel of the upper canister thereby permitting the plug to exit the upper canister and to travel downward through the channel of the upper valve, and the solid surface of the valve substantially blocks the flow of fluid around the valve.

26. The plug-dropping container of claim 25, wherein the plug is a dart.

27. The plug-dropping container of claim 26, wherein each of the upper and lower canisters further comprises:

a top opening;

a bottom opening; and

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

a bypass area for placing the inner surface of the respective canister in fluid communication with the annulus between the housing and the canister.

28. The plug-dropping container of claim 27, wherein the bypass area defines at least one port disposed in the canister.

29. The plug dropping container of claim 27, wherein the bypass area defines a gap between the top opening of the respective canister and the cementing head.

30. The plug-dropping container of claim 25, wherein:
the solid surface of the upper and lower valves defines a radial surface; and
each of the valves has a truncated portion so as to disrupt the radial surface around the respective valve channels, thus providing a means for bypass flow past the valves when the valves are in their respective plug-retained positions.

31. The plug-dropping container of claim 30, wherein the radial surfaces of the respective valves is rotated into close proximity with a lower opening in the upper and lower canisters, respectively, so as to block release of the upper and lower plugs when the upper and lower valves are in their respective plug-retained positions.

32. The plug-dropping container of 31, wherein the upper and lower valves are each spherical in shape.

33. The plug-dropping container of claim 31, wherein the upper and lower valves are each cylindrical in shape.

34. The plug-dropping container of claims 32 and 33, further comprising upper and lower stop members for limiting rotation of the upper and lower valves, respectively, to approximately 90 degrees.

35. The plug-dropping container of 25, wherein at least one of the upper and lower valves defines a plate.
36. The plug-dropping container of 35, wherein the plate comprises:
a solid portion as the solid surface; and
a through-opening offset from the solid portion to serve as the channel.
37. The plug-dropping container of 36, wherein the plate further comprises:
teeth along at least one side of the plate for interacting with a gear;
38. The plug-dropping container of 25, wherein the at least one of the upper and lower valves defines a flapper valve.
39. The plug-dropping container of 38, wherein:
the flapper valve comprises a solid curved flapper to serve as the solid surface, and a seat to serve as the channel;
the canister comprises a lower bypass port positioned below the flapper valve; and
the flapper valve further comprises a shaft for rotating the flapper from (1) an object-retained position such that the flapper blocks the downward release of the object from the canister to an object-released position but permits fluid to flow from the annulus, around the flapper, and through the lower bypass port, to (2) an object-released position such that the flapper substantially seals the lower bypass port and the seat receives the plug.
40. A plug-dropping container within a head member for releasing an object into a wellbore, the plug-dropping container comprising:
a tubular housing;
a tubular canister disposed within and generally aligned with the tubular housing so as to define an annulus between the tubular housing and the canister, the canister having an inner surface;

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

a channel along the inner surface of the canister, the canister channel being configured to receive the object therein;

a valve disposed within the tubular housing proximal to the lower end of canister, the valve having a solid radial surface, and having a channel through the valve;

wherein the valve is rotatable from an object-retained position to an object-released position such that (1) in its object-retained position, the radial surface of the valve substantially blocks the object from exiting the canister, and (2) in its object-released position, the channel of the valve is in substantial alignment with the channel of the canister thereby permitting the object to exit the canister and to travel downward through the channel of the valve, and wherein the radial surface around a perimeter of one end of the valve channel is placed in close proximity with the lower channel of the head member where it substantially blocks the flow in the annulus between the tubular housing and the canister in the object-released position.

41. The plug-dropping container of 40, wherein the valve is spherical in shape.

42. The plug-dropping container of 40, wherein the valve further comprises a bypass region which allows fluid to flow from the housing annulus to the lower channel of the head member when the valve is in its object-retained position.

43. The plug-dropping container of claim 42, wherein the valve bypass region comprises a truncated portion of the radial surface.

44. The plug-dropping container of claim 42, wherein the valve bypass region comprises at least one opening through the radial surface.

44. The plug-dropping container of claim 40, wherein the valve is cylindrical in shape.

PATENT

Attorney Docket No.: Weat /0153.P1

Express Mail: EV 351031328 US

45. The plug-dropping container of claim 40, further comprising a stop member for limiting rotation of the valve to approximately 90 degrees.

46. A plug-dropping container within a head member for releasing an object into a wellbore, the plug-dropping container comprising:

- a tubular housing;

- a tubular canister disposed within and generally aligned with the tubular housing so as to define an annulus between the tubular housing and the canister, the canister having an inner surface;

- a channel along the inner surface of the canister, the canister channel being configured to receive the object therein;

- a valve disposed within the tubular housing proximal to the lower end of canister, the valve defining a plate comprising a solid surface and a channel offset from the solid surface;

- wherein the valve is movable from an object-retained position to an object-released position such that (1) in its object-retained position, the solid surface of the valve blocks the object from exiting the canister, and (2) in its object-released position, the channel of the valve is in substantial alignment with the channel of the canister thereby permitting the object to exit the canister and to travel downward through the channel of the valve.

47. The plug-dropping container of claim 46, wherein fluids are permitted to flow from the housing annulus, around the plate, to the lower channel of the head member when the valve is in its object-retained position, but such flow is substantially blocked by the solid surface of the plate when the plate is in its object-retained position.

48. The plug-dropping container of claim 46, wherein fluids are permitted to flow from the housing annulus, through at least one channel in the plate, to the lower channel of the head member when the valve is in its object-retained position, but

such flow is substantially blocked by the solid surface of the plate when the plate is in its object-retained position.

49. The plug-dropping container of claim 45, wherein the plate further comprises: teeth along at least one side of the plate for interacting with a gear.

50. A plug-dropping container within a head member for releasing an object into a wellbore, the plug-dropping container comprising:

- a tubular housing;

- a tubular canister disposed within and generally aligned with the tubular housing so as to define an annulus between the tubular housing and the canister, the canister having an inner surface and a lower bypass port;

- a channel along the inner surface of the canister, the canister channel being configured to receive the object therein;

- a flapper valve disposed within the tubular housing proximal to the lower end of the canister but above the lower bypass port, the flapper valve comprising a solid curved flapper, a shaft for rotating the flapper, and a seat to serve as the channel;

- wherein the shaft is rotatable to move the flapper valve from an object-retained position to an object-released position such that (1) in its object-retained position, the curved flapper of the valve substantially blocks the object from exiting the canister, but fluids are permitted to flow around the flapper and through the lower bypass port, and (2) in its object-released position, the flapper moves to permit the object to exit the canister and to travel downward through the seat, and substantially seals the lower bypass port.